

## N-Channel Enhancement Mode Power MOSFET

### ■ Features

- Low On-resistance
- Capable of 2.5V Gate Drive
- Optimal DC/DC battery application

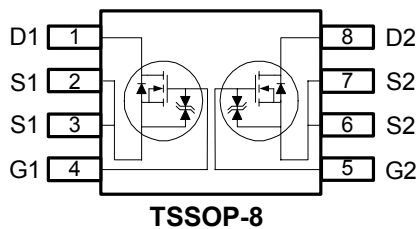
### ■ General Description

The Advanced Power MOSFET provides the designer with the best combination of fast switching, ruggedized device design, ultra low on-resistance and cost-effectiveness.

### ■ Product Summary

BV <sub>DSS</sub> (V)	r <sub>DS(on)</sub> (mΩ)	I <sub>D</sub> (A)
20	23	5

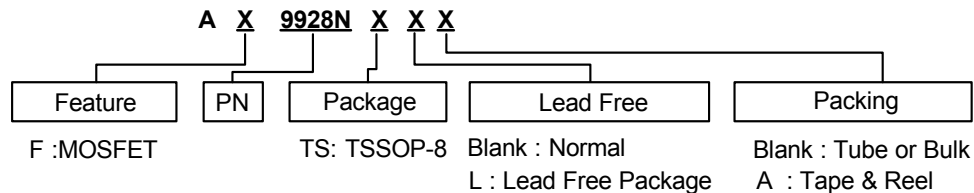
### ■ Pin Assignments



### ■ Pin Descriptions

Pin Name	Description
S1/2	Source
G1/2	Gate
D1/2	Drain

### ■ Ordering information





## N-Channel Enhancement Mode Power MOSFET

### ■ Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	20	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	V
$I_D$	Drain Current (Note 1), at $V_{GS}=4.5V$	at $T_A=25^\circ C$	5
		at $T_A=70^\circ C$	3.5
$I_{DM}$	Pulsed Drain Current (Note 2)	25	A
$P_D$	Total Power Dissipation	at $T_A=25^\circ C$	1
	Linear Derating Factor		0.008
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$

### ■ Thermal Data

Symbol	Parameter	Value	Units
Rthj-a	Thermal Resistance Junction-Ambient (Note 1) Max.	125	$^\circ C/W$

Note 1: Surface mounted on 1 in<sup>2</sup> copper pad of FR4 board, 208 $^\circ C/W$  when mounted on Min. copper pad.

Note 2: Pulse width limited by Max. junction temperature.

### ■ Electrical Characteristics at $T_J=25^\circ C$ (unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	20	-	-	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	Reference to 25 $^\circ C$ , $I_D=1mA$	-	0.02	-	V/ $^\circ C$
$R_{DS(on)}$	Static Drain-Source On-Resistance (Note 3)	$V_{GS}=4.5V, I_D=5A$	-	-	23	m $\Omega$
		$V_{GS}=2.5V, I_D=2A$	-	-	29	m $\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	0.5	-	-	V
$g_{fs}$	Forward Transconductance	$V_{DS}=10V, I_D=5A$	-	21	-	S
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=20V, V_{GS}=0V, T_J=25^\circ C$	-	-	1	$\mu A$
		$V_{DS}=20V, V_{GS}=0V, T_J=70^\circ C$	-	-	25	$\mu A$
$I_{GSS}$	Gate-Source Leakage	$V_{GS}=\pm 12V$	-	-	$\pm 10$	$\mu A$
$Q_g$	Total Gate Charge (Note 3)	$I_D=5A,$	-	15.9	-	nC
$Q_{gs}$	Gate-Source Charge	$V_{DS}=10V,$	-	1.5	-	nC
$Q_{gd}$	Gate-Drain ("Miller") Charge	$V_{GS}=4.5V$	-	7.4	-	nC
$t_{d(on)}$	Turn-On Delay Time (Note 3)	$V_{DS}=10V,$	-	6.2	-	ns
$t_r$	Rise Time	$I_D=1A,$	-	9	-	ns
$t_{d(off)}$	Turn-Off Delay Time	$R_G=3.3\Omega, V_{GS}=4.5V$	-	30	-	ns
$t_f$	Fall-Time	$R_D=10\Omega$	-	11	-	ns
$C_{iss}$	Input Capacitance	$V_{GS}=0V,$	-	530	-	pF
$C_{oss}$	Output Capacitance	$V_{DS}=20V,$	-	245	-	pF
$C_{rss}$	Reverse Transfer Capacitance	$f=1.0MHz$	-	125	-	pF

### ■ Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$I_S$	Continuous Source Current (Body Diode)	$V_D=V_G=0V, V_S=1.2V$	-	-	0.83	A
$V_{SD}$	Forward On Voltage (Note 3)	$T_J=25^\circ C, I_S=5A, V_{GS}=0V$	-	-	1.2	V

Note3: Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .

## N-Channel Enhancement Mode Power MOSFET

### ■ Typical Performance Characteristics

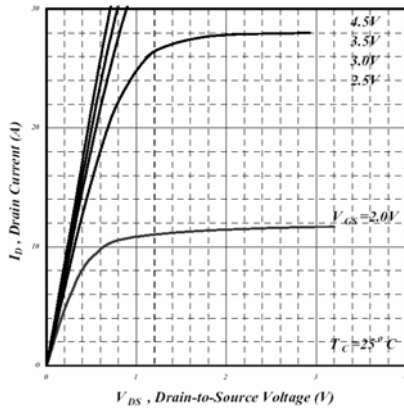


Fig 1. Typical Output Characteristics

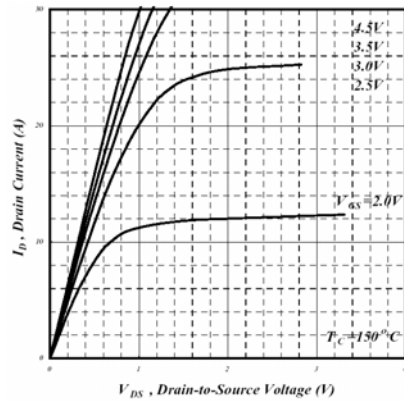


Fig 2. Typical Output Characteristics

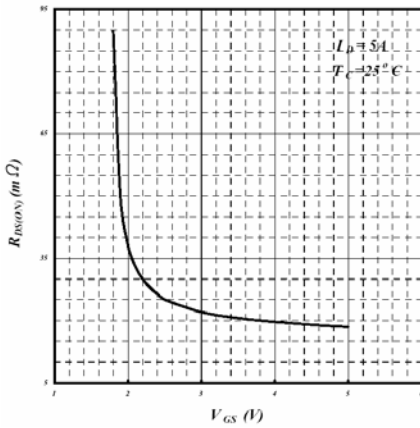


Fig 3. On-Resistance v.s. Gate Voltage

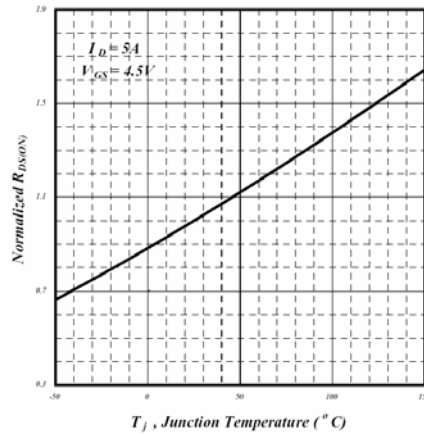


Fig 4. Normalized On-Resistance v.s. Junction Temperature

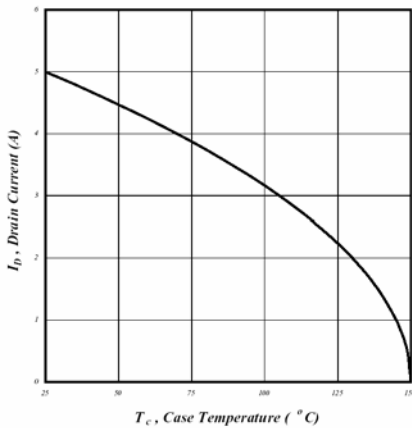


Fig 5. Maximum Drain Current v.s. Case Temperature

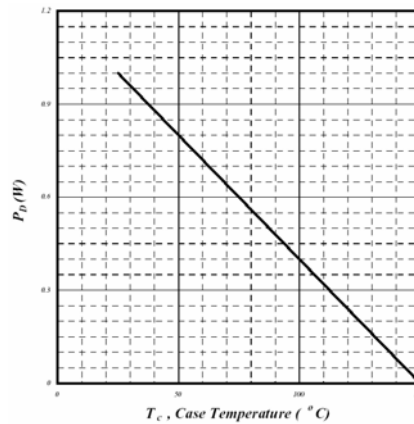


Fig 6. Typical Power Dissipation

## N-Channel Enhancement Mode Power MOSFET

### ■ Typical Performance Characteristics (Continued)

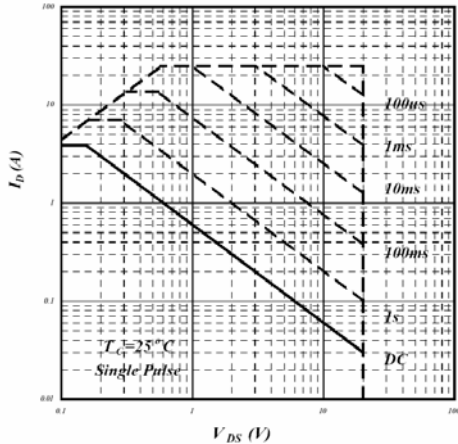


Fig 7. Maximum Safe Operating Area

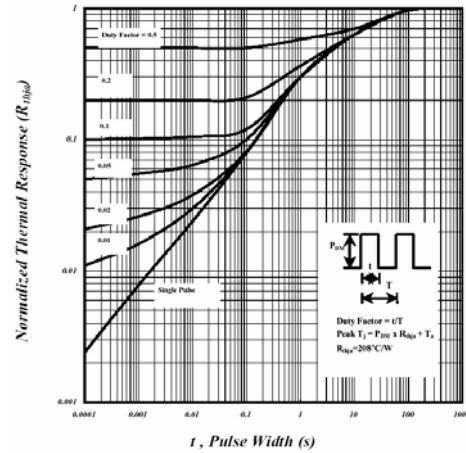


Fig 8. Effective Transient Thermal Impedance

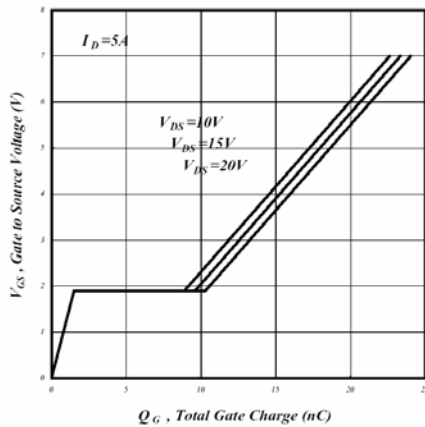


Fig 9. Gate Charge Characteristics

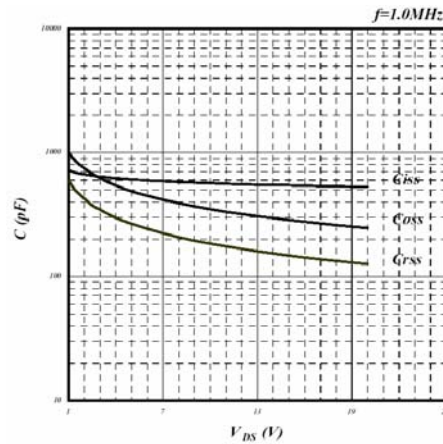


Fig 10. Typical Capacitance Characteristics

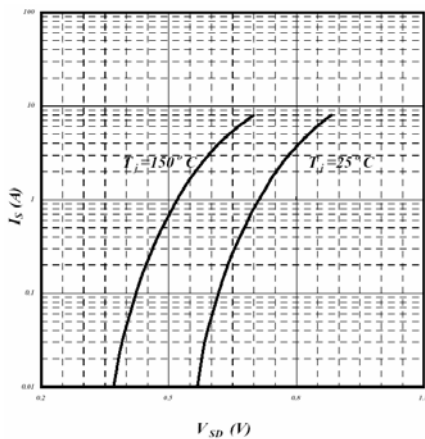


Fig 11. Forward Characteristic of Reverse Diode

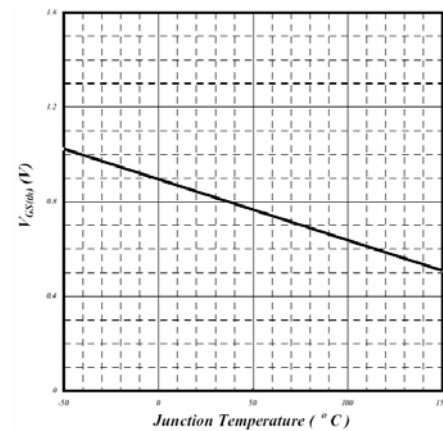


Fig 12. Gate Threshold Voltage v.s. Junction Temperature

## N-Channel Enhancement Mode Power MOSFET

### ■ Typical Performance Characteristics (Continued)

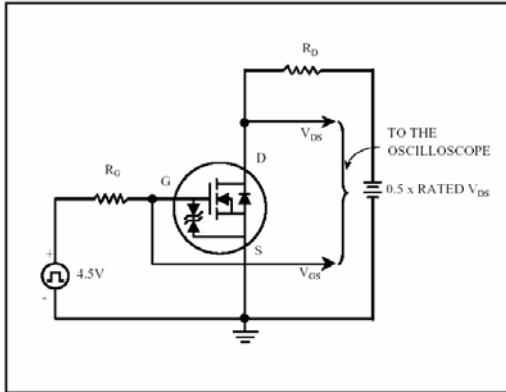


Fig 13. Switching Time Circuit

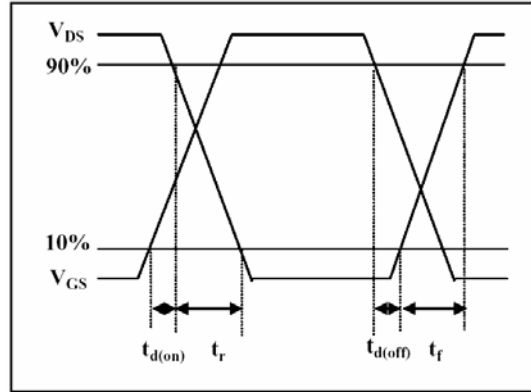


Fig 14. Switching Time Waveform

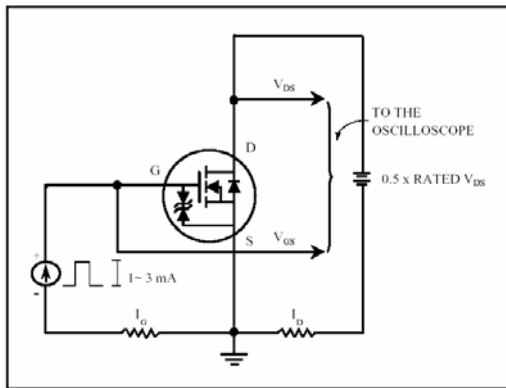


Fig 15. Gate Charge Circuit

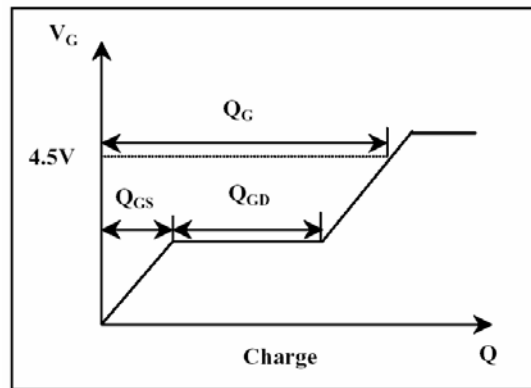
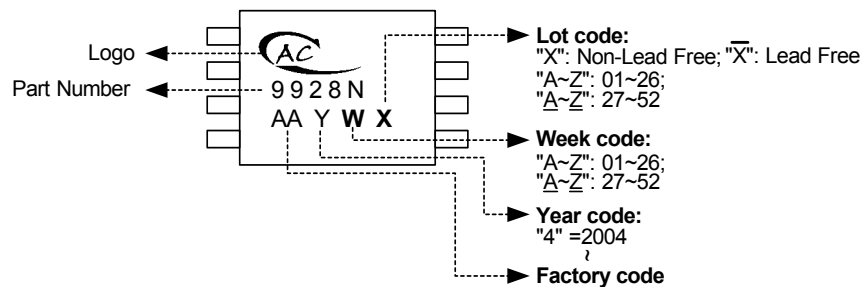


Fig 16. Gate Charge Waveform

### ■ Marking Information

TSSOP-8L

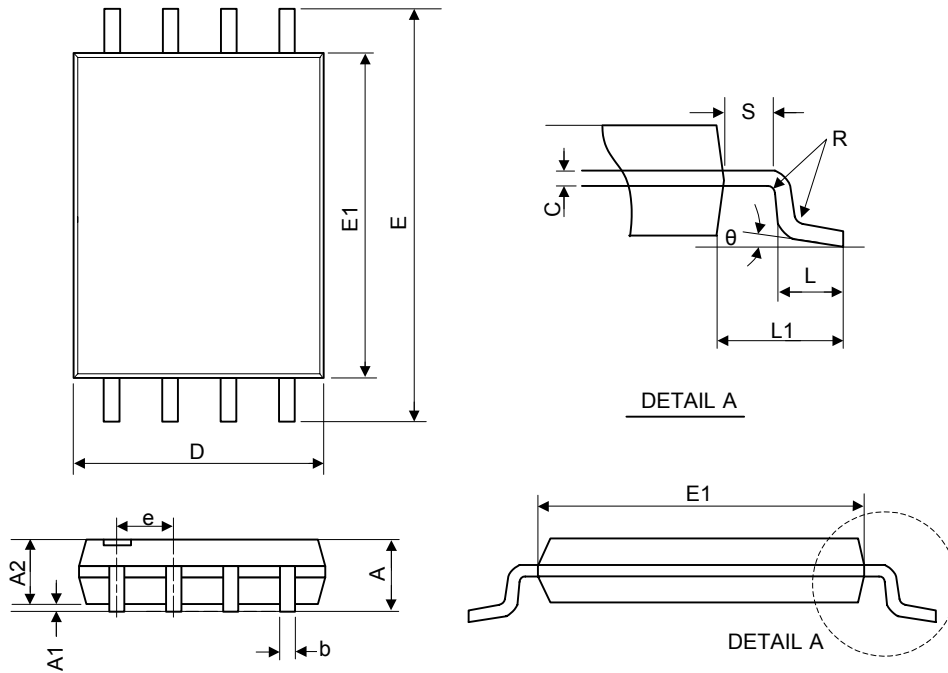
( Top View )



## N-Channel Enhancement Mode Power MOSFET

### ■ Package Information

Package Type: TSSOP-8L



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	1.05	1.10	1.20	0.041	0.043	0.047
A1	0.05	0.10	0.15	0.002	0.004	0.006
A2	0.99	1.00	1.05	0.039	0.039	0.041
b	0.25	0.28	0.30	0.010	0.011	0.012
C	0.10	0.13	0.15	0.004	0.005	0.006
D	2.90	3.00	3.10	0.114	0.118	0.122
E	6.20	6.40	6.60	0.244	0.252	0.260
E1	4.30	4.40	4.50	0.169	0.173	0.177
e	-	0.65	-	-	0.026	-
L	0.45	0.60	0.75	0.018	0.024	0.030
L1	0.90	1.00	1.10	0.035	0.039	0.043
R	0.09	-	-	0.004	-	-
S	0.20	-	-	0.008	-	-
θ	0°	-	8°	0°	-	8°



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